

**FEDERAL AID
ANNUAL RESEARCH PERFORMANCE REPORT**

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 25526
Juneau, AK 99802-5526

PROJECT TITLE: Nutritional influences on moose reproduction: relative importance of contributions from diet and body reserves

PRINCIPAL INVESTIGATOR: Tom Lohuis, Stacy Jenkins, John Crouse

COOPERATORS:

FEDERAL AID GRANT PROGRAM: Wildlife Restoration

GRANT AND SEGMENT NR: W-33-3

PROJECT NR: 1.60

WORK LOCATION: Moose Research Center, Soldotna

STATE: Alaska

PERIOD: 1 July 2004–30 June 2005

I. PROGRESS ON PROJECT OBJECTIVES SINCE PROJECT INCEPTION *(Do not complete for projects only 1 year old.)*

II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD

JOB 1: Overwinter energy expenditure.

Due to the cost of doubly labelled water, no work was performed on this objective during the FY 05 reporting period. We will begin this assessment in November 2005.

JOB 2: Overwinter protein requirements.

Due to the cost of protein and urea tracers, no work was performed on this objective during the FY05 reporting period. We will begin measurement of these parameters in November 2005.

JOB 3: Mobilization of body reserves.

Body fat and tissue depth relative to underlying bone for assessment of protein levels were measured by ultrasonography twice during the winter of 2004–2005 at the conclusion of feeding trials described below. Body fat and protein were estimated in 1 pregnant and 2 nonpregnant moose on 11 March and 12 May 2005. This data is currently being analyzed.

Please note: This is a progress report and the information contained within may be further analyzed and refined.

Job 4: Dietary intake observation.

Each feeding trial described under Job 5 below requires approximately one month to complete due to the necessity of acclimatizing study moose to the pelleted diet from natural browse. We did not expect that the transition period would require this amount of time.

Due to the length of this transition period, data collected on moose that have been fed pelleted ration are not expected to be representative of wild moose. Therefore, the decision was made to forgo this objective for the FY04–05 reporting period and to add 4 additional animals to the study beginning in November 2005 to proceed with this investigation. These animals will not be maintained on a pelleted diet and will be used exclusively for dietary intake observation while they forage in the 1-mile square pens at the MRC.

Job 5: Feeding trials.

During December 2004 and January 2005, we completed renovations on the metabolic stalls that allowed for the initiation of work on this objective. Two feeding trials were completed in February–March 2005 and April–May 2005 to measure caloric and nitrogen requirements. Two nonpregnant and one pregnant moose were used in the first trial during the second trimester of pregnancy between 23 February and 11 March. One pregnant animal was excluded from this feeding trial due to illness. This illness was subsequently resolved and 2 pregnant and 2 nonpregnant moose were used in the second trial during the third trimester of pregnancy between 19 April and 12 May 2005. During feeding trials, moose were provided a measured amount of pelleted feed and water *ad libitum*. Feed was provided in 3 equal portions daily, and complete collection of urine and fecal material was made every 12 hours over a 5-day period. Feed, fecal, and urine samples are currently being analyzed for energy, protein, and nitrogen content.

While data collection during each feeding trial requires only 5 days, a 3-week transition period is required prior to each trial to ensure that moose are acclimatized to the pelleted diet. Insufficient acclimatization can cause illness or death. During this period, animals are fed a mix of natural browse and measured amounts of pelleted feed 3 times daily. The proportion of pelleted feed is gradually increased, and that of the natural browse decreased, until the moose are maintained completely on the pelleted diet. After the study animals are able to be fed the pelleted diet exclusively, data collection can commence.

Job 6: Body composition index.

We held 2 moose in preparation for body composition analysis during April 2005. However, due to the negligence of the principal investigator (Lohuis) these animals broke through the holding fence and escaped into the larger 1-mile square pen where we were unable to retrieve them for study due to the appearance of spring vegetation. Early in the winter, moose can be “baited” with rich, pelleted feed. However, once green-up appears, they respond less to this lure and are typically not available for capture or handling. These animals, as well as others, will be captured and processed for body composition analysis during winter 2005–2006.

Job 7: Preparation of reports and publications.

Annual research performance progress reports were prepared and submitted for project 1.60.

III. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

In the first field test of techniques developed recently at the Moose Research Center, MRC staff measured body condition in free-ranging moose on the Gustavus Forelands in collaboration with ADF&G biologists K. White and N. Barten (see project 1.61). The work tested how body composition indices and reproductive success are influenced by overwinter energy expenditure and protein availability. We found that mean percent body fat of cows captured in November 2004 (n=19) and March 2005 (n=22) were 9.2% and 6.9%, respectively. While palpation-based body condition scores (BCS) were collected from both populations, further refinement and evaluation of this score's relationship to total fat and protein reserves must occur prior to interpretation of the data.

Foraging behavior of the Gustavus radiocollared moose were observed for activity, diet composition, and intake (bite size, bite rate) during November 2004 (n=10) and February 2005 (n=7) for 61.2 hours and 34.3 hours, respectively. Concurrent browse surveys (n=21) quantified willow biomass availability and utilization. Data suggest a decline in the availability of preferred *Salix* biomass from fall to spring, corresponding to an increase in estimates of secondary forage consumption, shifting primarily to *Equisetum* (Table 1). A similar trend was observed in diet composition analyses of feces collected seasonally from collared and un-collared moose.

The extremely high density of moose overwintering on the Gustavus Forelands has resulted in the overutilization of *Salix* species and necessitated a seasonal dietary shift to a less preferred forage. Although generally unavailable to moose due to burial in snow and/or encapsulation in ice, relatively mild winters allow for the exploitation of this spatially concentrated forage, and it appears to be a significant component of their diet following *Salix* depletion. Although moose are able to harvest *Equisetum* at a rate nearly 5 times that of *Salix*, nutritional quality (digestibility, energy, protein, and tannin content), availability, and resiliency of this forage must be incorporated into acquisition rates prior to interpretation of this dietary shift. Subsequently, the impact of forage availability and nutrient intake on seasonal body condition changes will be investigated. Seasonal body condition data are currently being analyzed.

Table 1 Mean intake rates and diet composition estimated through direct observation and fecal analyses of free-ranging moose on the Gustavus Forelands, November 2004 and February 2005.

	NOVEMBER 2004	FEBRUARY 2005
<i>Salix</i> Intake Rate (g DM/minute)	8.4	7.9
<i>Equisetum</i> Intake Rate (g DM/minute)	42.4	38.2
% <i>Salix</i> in Diet – Observational	64.4	8.6
% <i>Salix</i> in Diet – Fecal*	36.0	27.8
% <i>Equisetum</i> in Diet – Observational	33.6	89.8
% <i>Equisetum</i> in Diet – Fecal*	36.9	47.8

*Fecal samples collected November 2003 and March 2004. Samples collected November 2004 and February 2005 are currently being analyzed.

IV. PUBLICATIONS

As this project is only one year old, data is still being collected and analyzed.

V. RECOMMENDATIONS FOR THIS PROJECT

VI. APPENDIX

None

VII. PROJECT COSTS FOR THIS SEGMENT PERIOD

Stewardship Investment items purchased: list any equipment or other items purchased for which the cost of the individual item was \$5,000 or more (include cost)
None

Total Costs

FEDERAL AID SHARE \$63,200 STATE SHARE \$21,100 = TOTAL \$84,200

VIII. PREPARED BY:

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SUBMITTED BY:

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